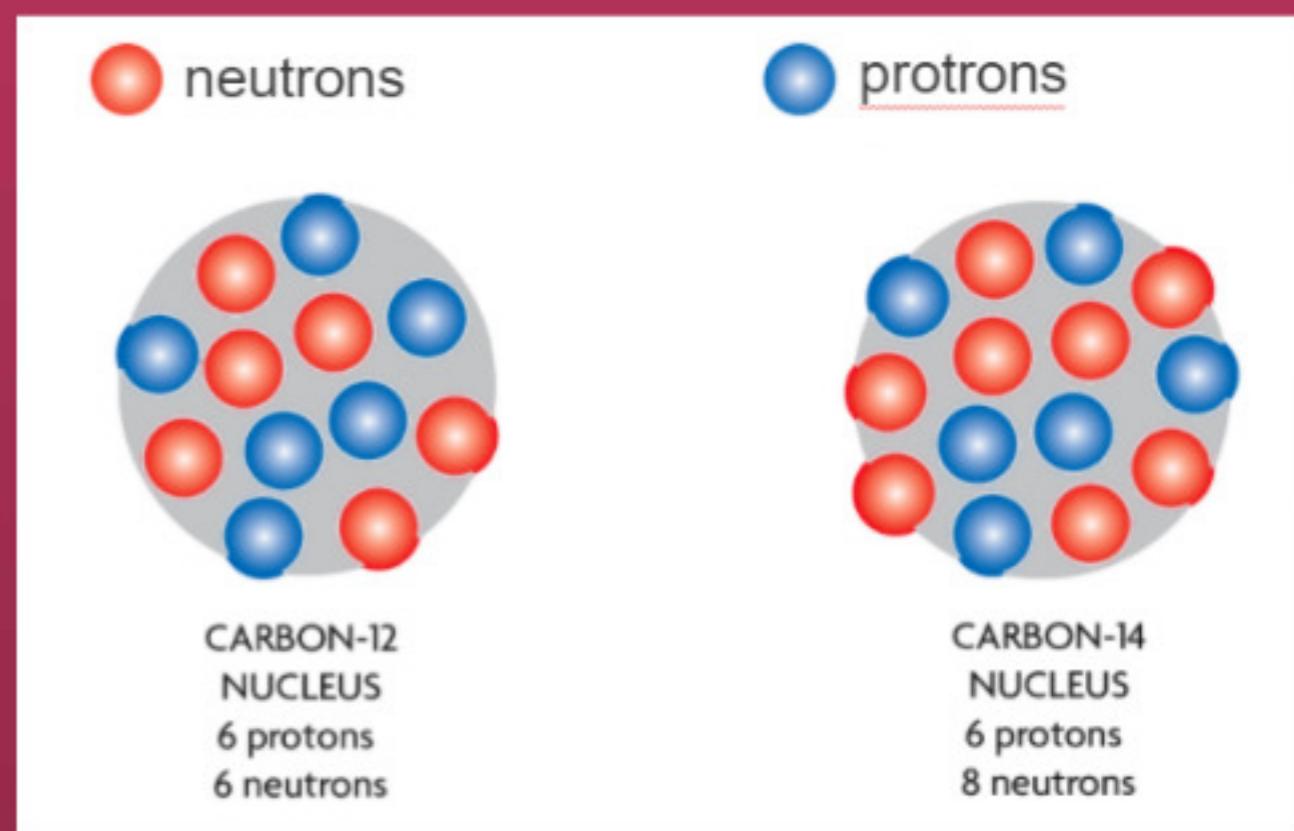# Absolute Dating

Radiometric dating uses decay of unstable isotopes
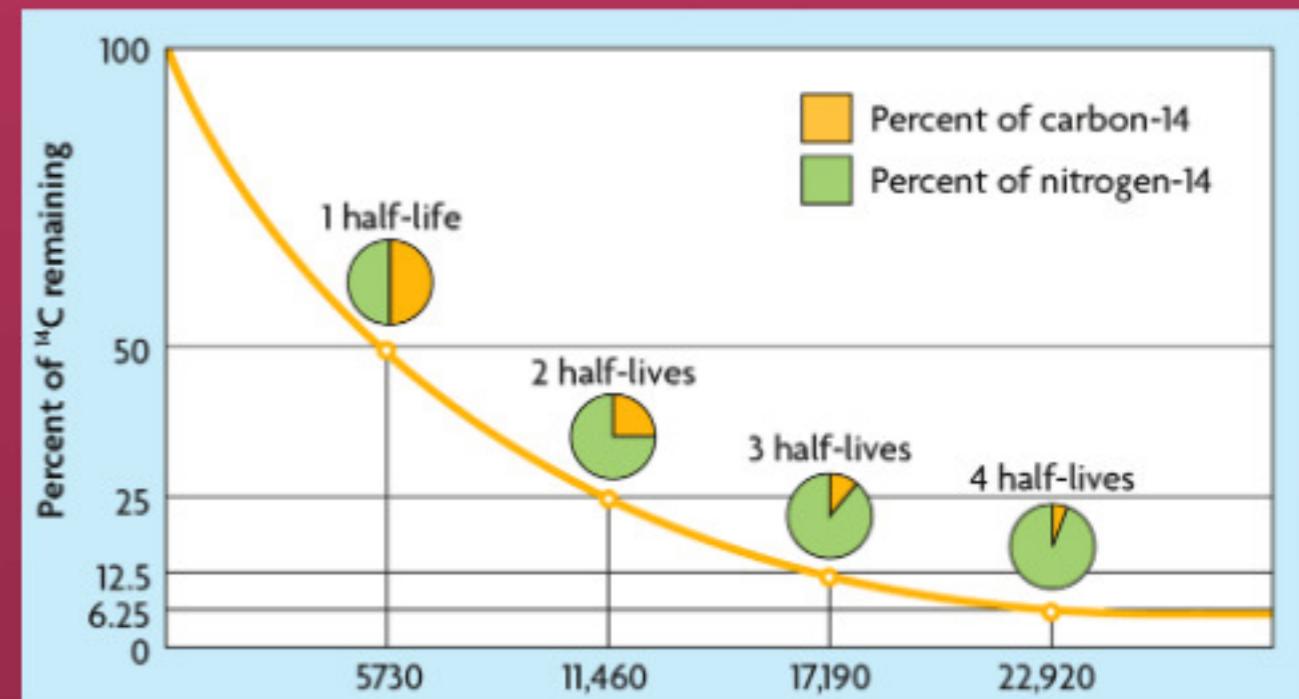
Isotopes are atoms of an element that differ in their number of neutrons

neutrons

protrons

CARBON-12
NUCLEUS
6 protons
6 neutrons

CARBON-14
NUCLEUS
6 protons
8 neutrons

00:00

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Radiometric Dating

A half-life is the amount of time it takes for half of the isotope to decay.

Page 1 ESRT's

RADIOACTIVE ISOTOPE	DISINTEGRATION	HALF-LIFE (years)
Carbon-14	$^{14}C \longrightarrow {}^{14}N$	5.7×10^3
Potassium-40	$^{40}K \begin{smallmatrix} \nearrow {}^{40}Ar \\ \searrow {}^{40}Ca \end{smallmatrix}$	1.3×10^9
Uranium-238	$^{238}U \longrightarrow {}^{206}Pb$	4.5×10^9
Rubidium-87	$^{87}Rb \longrightarrow {}^{87}Sr$	4.9×10^{10}

Example

If Carbon-14 goes through 2 half lives...

a) How many years will go by?

5,700 x 2 = 11,400 years

b) What % of the original mass will remain?

25%

c) What % of daughter product will you have?

75%

d) What is the daughter product?

Nitrogen-14

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How Does Radiocarbon Dating Work? - Instant Egghead #28

Limits to Radiometric Dating

After 10 half-lives, there is so little original substance remaining that it is hard to trace

Carbon-14 is great to use because it is found in many places

However, it is only effective in dating up to 50,000 years ago. Beyond that it is useless.

For the oldest rocks, we use the other radioactive isotopes when we can find it in the rock.

Problem is these other isotopes are not as abundant

If we cannot determine absolute ages, we then will determine relative ages.

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Time To Climb